AMENDMENT TO THE CLAIMS

Attached is a listing of claims that will replace all prior version, and listings, of claims in the application:

<u>What is claimed is:</u>

1. **(Currently amended)** A finger operating in mixed-rate, comprising:

a descrambling means that descrambles received signals by multiplying a PN-code with the received signals using frame timing information;

a pilot signal generating means that produces a pilot signal that is to be used as input of a weight vector computing means to compute a weight vector, by using a descrambled signal from the descrambling means, and finds out estimation value for delayed phase of each traffic channel;

the weight vector computing means that produces the weight vector by using signals from the descrambling means and the pilot signal generating means;

a general weighting means for producing a general weighted signal, by compensating phase delay of [[the]] a base-band received signal with the weight vector;

a pilot phase estimation means that produces phase compensation signal to compensate phase delay of each channel by using the weight vector and the pilot signal;

a Walsh despreading means for providing received data for each of traffic channels, by using outputs of the general weighting means, the PN-code and corresponding Walsh codes;

and a channel compensation means that compensates phase distortion caused by the phase delay to each output of the Walsh despreading means by using output of the pilot phase estimation means.

2. **(Original)** The finger according to claim 1, further comprises a tracking means for producing frame tracking information for compensating small changes in path delay.

3. **(Original)** The finger according to claim 2, wherein the tracking means produces the frame tracking information from difference between two energies which are obtained by integrating results of early and late descrambling wherein a first and a second synch time information are used, respectively.

4. **(Original)** The finger according to claim 2, wherein the tracking means produces the frame tracking information from difference between two energies which are obtained by squaring weighted sums of integrations of descrambled signals provided through early and late descrambling wherein a first and a second synch time information are used, respectively.

5. **(Original)** The finger according to claim 2, wherein the tracking means produces the frame tracking information from difference between two energies which are obtained by squaring results of integrations of weighted sums between the weight vector and descrambled signals provided through the early and late descrambling wherein a first and a second synch time information are used, respectively.

6. **(Original)** The finger according to claim 3, wherein the tracking means produces the frame tracking information from difference between two energies which are obtained by integrating results of the early and late descrambling wherein the first and the second synch time information are used, respectively, such the frame tracking information is produced after filtering the difference between the two energies.

7.   **(Original)** The finger according to claim 4, wherein the tracking means produces the frame tracking information from difference between two energies which are obtained by integrating results of the early and late descrambling wherein the first and the second synch time information are used, respectively, such the frame tracking information is produced after filtering the difference between the two energies.

8.   **(Original)** The finger according to claim 5, wherein the tracking means produces the frame tracking information from difference between two energies which are obtained by integrating results of the early and late descrambling wherein the first and the second synch time information are used, respectively, such the frame tracking information is produced after filtering the difference between the two energies.

9.   **(Original)** The finger according to claim 3, wherein the first synch time information for the early descrambling is earlier than the frame timing information by about 0.2 to 0.5 chip duration while the second synch time information for the late descrambling is later than the frame timing information by about 0.2 to 0.5 chip duration.

10.   **(Original)** The finger according to claim 4, wherein the first synch time information for the early descrambling is earlier than the frame timing information by about 0.2 to 0.5 chip duration while the second synch time information for the late descrambling is later than the frame timing information by about 0.2 to 0.5 chip duration.

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11.   **(Original)** The finger according to claim 5, wherein the first synch time information for the early descrambling is earlier than the frame timing information by about 0.2 to 0.5 chip duration while the second synch time information for the late descrambling is later than the frame timing information by about 0.2 to 0.5 chip duration.

12.   **(Original)** The finger according to claim 1, wherein the descrambling means multiplies the received signal in digital state(I_rx, Q_rx) with a local PN-code using a finger timing information (f_timing) provided from outside finger.

13.   **(Currently amended)** The finger according to claim 1, wherein the pilot signal generating means retrieves the pilot signal to be used as input of weight vector computing means by integrating output (y vector signal) of the descrambling means for preset period of time.

14.   **(Currently amended)** The finger according to claim 13, <u>wherein the output of the pilot signal generating means and the descrambling means are denoted as y_vector signal and x_vector signal, respectively, and</u> wherein the weight vector computing means produces the weight vector (Weight_I, Weight_Q) using the x_vector signal and the y_vector signal.

15.   **(Original)** The finger according to claim 14, wherein the weight vector computing means is reset to initial state upon reception of frame reset signal (f_reset) which is generated by finger death signal (f_death) when the PN-code acquisition is lost such that PN-code acquisition for lost path can be restarted with initial state.

16. **(Currently amended)** The finger according to claim 1, wherein the general weighting means produces [[the]] an array output by multiplying the weight vector of chip-rate from the weight vector computing means with the descrambled signal (I_rx, Q_rx) and summing up results of multiplications.

17. **(Currently amended)** The finger according to claim 1, wherein the pilot phase estimation means produces a phase compensation signal to compensate phase delay of each traffic channel by multiplying the weight vector from the weight vector computing means with the pilot signal from the pilot signal generating means[[;]].

18. **(Currently amended)** The finger according to claim 1, wherein the Walsh despreading means includes:

FCH (fundamental channel) despreading means for retrieving data transmitted through the FCH by descrambling [[the]] an array output through multiplication of the array output with the PN-code and further multiplying result of the descrambling of the array output with the Walsh code corresponding to the FCH;

DCCH (dedicated control channel) despreading means for retrieving data transmitted through DCCH by descrambling the array output through multiplication of the array output with the PN-code and further multiplying result of the descrambling of the array output with the Walsh code corresponding to the DCCH;

SCH 1 (Supplemental channel 1) despreading means for retrieving data transmitted through SCH 1 by descrambling the array output through multiplication of the array output with the PN-code and further multiplying result of the descrambling of the array output with the Walsh code corresponding to the SCH 1; and

SCH 2 (Supplemental channel 2) despreading means for retrieving data transmitted through SCH 2 by descrambling the array output through multiplication of the array output with the PN-code and further multiplying result of the descrambling of the array output with the Walsh code corresponding to the SCH 2.

19.   **(Original)** The finger according to claim 17, wherein the channel compensating means is located for compensating the phase distortion due to path delay associated with each of traffic channels the FCH, the DCCH, the SCH 1, and the SCH 2.

20.   **(Currently amended)** The finger according to claim [[1]]_2_, wherein the tracking means, for providing exact chip synchronization through the fine-tuning of PN-code acquisition, includes:

first complex descrambling means for multiplying the received signal with the PN-code of 1/2 chip advanced time to the f_timing;

second complex descrambling means for multiplying the received signal with the PN-code of 1/2 chip retarded time to the f_timing;

first and second energy estimation means for providing correlation energies by integrating results of ~~the early descrambler and late descrambler~~ first and second complex descrambling means, respectively; and

tracking information (f_trk) generating means for providing the tracking information (f_trk) by comparing magnitudes of results of the first and second energy estimation means.

21.   **(Currently amended)** A demodulation apparatus that uses fingers operating in mixed-rate for mobile communication system comprising:

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an analog-to-digital converter (ADC) for converting analog signal, which has been frequency-down converted to base-band, to corresponding digital signal through oversampling procedure;

a searcher for transmitting ~~the searcher energy (or, equivalently, the correlation energy)~~ correlation energy that exceeds preset threshold value to lock detector while the ~~searcher energy~~ correlation energy is computed through correlation procedure between output of the ADC and [[the]] a PN-code corresponding to [[the]] a pilot channel;

a lock detector for generating signals needed for accurate frame synchronization ~~such as~~ which are [[the]] a frame reset (f_reset), [[the]] a frame timing (f_timing), [[the]] a frame death (f_death) information using the correlation energy provided from the searcher; and

at least one finger wherein [[the]] traffic channel signals are weighted in the mixed-rate with [[the]] weights which are obtained from [[the]] received data in the pilot channel of [[the]] a reverse link.

22.   **(Currently amended)** The demodulation apparatus according to claim 21, wherein ~~the finger~~ each finger comprises:

a descrambling means that descrambles base-band received signal by using frame time information;

a pilot signal generating means that produces the pilot signal from the descrambling means and finds out estimation value for delayed phase of each traffic channel;

a weight vector computing means that produces the weight vector using signals from the descrambling means and the pilot signal generating means;

a general weighting means for producing [[the]] an array output using the weight vector and the received signal;

a pilot estimation means that produces phase compensation signal to compensate phase delay of each channel using the weight vector and the pilot signal;

a Walsh despreading means that produces received data for each of the traffic channels, by using outputs of the general weighting means, the PN-code and corresponding Walsh codes; and

a channel compensation means that compensates phase distortion caused by the phase delay to each output of the Walsh despreading means using output of [[the]] pilot weighting means and traffic channels weighting means[[..]].

23. **(Currently amended)** The demodulation apparatus according to claim 22, wherein the finger each finger further comprises a tracking means for producing [[the]] frame tracking information produced from difference between two energies which are obtained by integrating results of [[the]] early and late descrambling wherein [[the]] first and second synch time information are used, respectively, in order to produce frame tracking information for compensating small changes in path delay.

24. **(Original)** The demodulation apparatus according to claim 21, wherein the searcher comprises:

a received signal processing means for achieving envelope detection of the received data such that the correlation energy to be obtained at each antenna channel;

an adding means for summing up the correlation energies at each of antenna channels obtained from the received signal processing means; and

an output means for generating result of the adding means as final output of non-coherent detection.

25. **(Original)** The demodulation apparatus according to claim 24, wherein the received signal processing means comprises:

first arithmetic means for computing magnitude of the correlation energy at each antenna channel by adding results of square of processing results along I-channel and Q-channel; and

second arithmetic means for summing up results of computed magnitude of the correlation energy at each of antenna channels.

26. **(Currently amended)** A demodulation method using a finger that operates in mixed-rate for mobile communication system, comprising:

a first step of descrambling received signal by multiplying a PN-code with a received signal using frame timing information (f_timing);

a second step of generating [[the]] a pilot signal obtained by integrating the descrambled signal in order to use [[it]] the pilot signal for computing [[the]] a weight vector;

a third step of computing the weight vector by using the descrambled data and the pilot signal;

a fourth step of generating [[the]] an array output by summing up the results of multiplication between the weight vector and the received signal in such a way that inter-element phase difference be compensated;

a fifth step of generating the phase compensating signal to compensate phase delay of channel by multiplying the weight vector with the pilot signal;

a sixth step of generating received data for each of the traffic channel[[s]] by using outputs of [[the]] a general weighting step, the PN-code, and corresponding Walsh codes; and

a seventh step of compensating [[the]] a_phase distortion due to the channel delay by

using the phase compensation signal to weighted traffic signal.

27.   **(Original)** The demodulation method according to claim 26, wherein the fourth

step, the weight vector is multiplied by the pilot signal after the pilot signal is exactly calculated

through phase delay estimation.

28.   **(Currently amended)** A computer-readable recording medium for recording a

program that embodies the method using fingers operating in mixed-rate comprising:

a first function of descrambling received signal by multiplying a PN-code with a received

signal using frame timing information (f_timing);

a second function of generating a pilot signal obtained by integrating a descrambled

signal in order to use [[it]] the pilot signal for computing weights;

a third function of computing a weight vector using the descrambled signal and the pilot

signal;

a fourth function of generating [[the]] an array output by summing up the results of

multiplication between the weight vector and the received signal in such a way that inter-element

phase difference be compensated;

a fifth function of generating the phase compensation signal to compensate phase delay of

channel by multiplying the weight vector with the pilot signal;

a sixth function of generating received data for each of the-traffic channel[[s]] by using

outputs of [[the]] a general weighting step, the PN-code, and corresponding Walsh codes; and

a seventh function of compensating [[the]] a phase distortion due to the channel delay by

using the phase compensation signal to weighted traffic signal.